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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/944,284	08/31/2001	Jon A. Casey	FIS920010127US1 (IFI-10-5)	1893
29037	7590	08/13/2004	EXAMINER	
DRIGGS, LUCAS, BRUBAKER & HOGG CO. L. P. A. DEPT IFI 8522 EAST AVENUE MENTOR, OH 44060			HARAN, JOHN T	
			ART UNIT	PAPER NUMBER
			1733	

DATE MAILED: 08/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/944,284	Applicant(s) CASEY ET AL.	
	Examiner John T. Haran	Art Unit 1733	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office Action is in response to the amendment and remarks filed on 7/22/04. The rejection of the claims under 103(a) as being obvious over Curcio et al is withdrawn in light of Applicant's declaration stating that the Curcio and the present application have a common inventor and are both currently owned by the same party in combination with a terminal disclaimer of the Curcio et al patent.

Terminal Disclaimer

2. The terminal disclaimer filed on 7/22/04 disclaiming the terminal portion of any patent granted on this application, which would extend beyond the expiration date of U.S. Patent 6,465,084 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 4, and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kariya (WO 01/42006) in view of Bross et al (U.S. Patent 5,517,751) and optionally in view of Chung (U.S. Patent 6,376,769).

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It is noted that the English version of Kariya (U.S. Patent 6,440,542) is relied upon and referred to for the teachings of Kariya.

Kariya teaches a method for forming a laminated composite printed circuit board with a plurality of at least three superimposed subcomposites wherein a plurality of at least three organic dielectric subcomposite structures, each having a plurality of through via openings and each having printed wiring on at least one face, are provided; each via opening is filled with a conductive paste material that can be cured and the paste material extends beyond the openings of the subcomposite structure; the subcomposites are stacked with adhesive layers between the subcomposites with holes provided therein for the conductive paste so that the vias of adjacent subcomposites are aligned and the conductive paste extending from the vias contact with each other; each subcomposite structure has aligned guide holes that cooperate with guiding pins to properly align the subcomposite structures during the stacking; and then the conductive paste is fully cured to form a laminated structure (Column 7, line 55 to Column 9, line 9; Figures 3-4). Kariya also teaches that the adhesive layers are laid down as a semi-cured resin layer (sheets) (Column 4, lines 24-26). One skilled in the art would have readily appreciated that use of the terminology "laid down" implies the semi-cured resin layer is a sheet. Furthermore, Chung is optionally cited as evidence that it is conventional that semi-cured resin adhesive layers are sheets (Column 16, lines 10-19).

Kariya teaches that at least two adjacent subcomposites have extending conductive paste structures that contact each other during the stacking step and

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fuse together in the curing step to form an interconnect, but is silent towards forming an interconnect between aligned vias in three adjacent subcomposite structures with contacting conductive paste structures. First it is noted that the configuration depicted in the Figures is merely exemplary and one skilled in the art would have readily appreciated that configuration of interconnects vary depending upon the ultimate use of the printed circuit board. Furthermore, it is well known and conventional for interconnect structures to be formed from the vias of three aligned subcomposite structures with extending conductive structures that are in contact and fuse together to form an interconnect, as shown for example in Bross et al (See Figures 3-4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form an interconnect from the aligned filled vias of at least three adjacent subcomposite structure with the conductive paste structures contacting each other and fusing together during curing in the method of Kariya as suggested in Bross et al.

Regarding claim 4, Kariya teaches the via openings are free of plating (See Figures).

Regarding claims 7-9, Kariya teaches the via openings are filled with the conductive paste through a mask (Column 8, lines 16-21), one would expect the mask to be registered and aligned with the via holes, and it is conventional to also use the mask to apply circuitry to the subcomposite and it would have been obvious to do so.

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5. Claims 3, 5, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kariya (WO 01/42006) in view of Bross et al (U.S. Patent 5,517,751) and optionally in view of Chung (U.S. Patent 6,376,769) as applied to claims 1, 4, and 7-9 above, and further in view of St. John (U.S. Patent 6,337,037).

Regarding claims 3, 5, and 6, Kariya is silent towards copper plating the vias or partially curing the conductive paste prior to lamination, however such are well known and conventional steps in the process of making composite printed circuit boards, as shown for example in St. John. St. John teaches both plating the via holes with copper and not plating the via holes (Column 6, lines 41-63). St. John teaches partially curing the conductive paste before laminating (Column 7, lines 55-57). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use conventional techniques in the method of Kariya such as partially curing the conductive paste prior to laminating and plating the via holes with copper, as suggested for example in St. John.

6. Claims 1 and 3-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over St. John (U.S. Patent 6,337,037) in view of Bross et al (U.S. Patent 5,517,751) and Kariya (WO 01/42006) and optionally in view of Chung (U.S. Patent 6,376,769).

St. John teaches a method of forming a laminated composite printed wiring structure of a plurality of at least three superimposed subcomposites wherein a plurality of at least three organic dielectric subcomposite structures,

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each having a plurality of through via openings and each having printed wiring on at least one face, are provided; each via opening is filled with a conductive paste material that can be cured and the paste material extends beyond the openings of the subcomposite structure; the subcomposites are stacked so that the vias of adjacent subcomposites are aligned and the conductive paste extending from the vias contact with each other; and then the conductive paste is fully cured to form a laminated structure (Column 7, line 40 to Column 8, line 6).

St. John teaches that at least two adjacent subcomposites have extending conductive paste structures that contact each other during the stacking step and fuse together in the curing step to form an interconnect (See Figure 1), but is silent towards forming an interconnect between aligned vias in three adjacent subcomposite structures with contacting conductive paste structures. First it is noted that the configuration depicted in the Figures is merely exemplary and one skilled in the art would have readily appreciated that configuration of interconnects vary depending upon the ultimate use of the printed circuit board. Furthermore, it is well known and conventional for interconnect structures to be formed from the vias of three aligned subcomposite structures with extending conductive structures that are in contact and fuse together to form an interconnect, as shown for example in Bross et al (See Figures 3-4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form an interconnect from the aligned filled vias of at least three adjacent subcomposite structure with the conductive paste structures contacting

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each other and fusing together during curing in the method of St. John as suggested in Bross et al.

St. John also teaches that an adhesive layer is formed between the subcomposites when the adhesive extending beyond the via spreads between the subcomposites during lamination, however one skilled in the art would have readily appreciated that such might not be sufficient and would be motivated to use the well known and conventional technique of applying adhesive layers in the form of sheets with openings for the extending conductive pastes as shown for example in Kariya (relying on English version U.S. Patent 6,440,542 Column 8, line 64, to Column 9, line 2). Kariya teaches that the adhesive layers are laid down as a semi-cured resin layer (sheets) (Column 4, lines 24-26). One skilled in the art would have readily appreciated that use of the terminology "laid down" implies the semi-cured resin layer is a sheet. Furthermore, Chung is optionally cited as evidence that it is conventional that semi-cured resin adhesive layers are sheets (Column 16, lines 10-19). It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply a separate adhesive layer sheet with holes for the conductive pastes between the subcomposites in order to ensure adequate adhesion in the method of St. John, as suggested in Kariya.

St. John is also silent towards providing a plurality of aligned index openings in each subcomposite which cooperate with a fixture to align the via holes in adjacent subcomponent structures when in superimposed relationship. However, it is well known and conventional in art when forming multilayered

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articles that need proper alignment of the layers to have index openings in each sheet and to lay the sheets on a fixture through the index openings so that the stack is properly aligned, as shown for example in Kariya (relying on English version U.S. Patent 6,440,542 Column 8, lines 34-43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use conventional means to ensure proper alignment and registration of the stacked subcomposites by providing index openings in each subcomposite to cooperate with a fixture (guiding pin) as suggested by Kariya in the method of St. John.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply a separate adhesive layer sheet with holes for the conductive pastes between the subcomposites in order to ensure adequate adhesion and to use conventional means to ensure proper alignment and registration of the stacked subcomposites by providing index openings in each subcomposite to cooperate with a fixture (guiding pin) in the method of St. John, as suggested in Kariya.

Regarding claims 3-5, St. John teaches both plating the via holes with copper and not plating the via holes (Column 6, lines 41-63).

Regarding claim 6, St. John teaches partially curing the conductive paste before laminating (Column 7, lines 55-57).

Regarding claims 7-9, St. John is silent towards using an aligned mask to fill the vias and form the circuitry, however such is notoriously well known and

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conventional and it would have been obvious to do so in the method of St. John, as modified above.

Response to Arguments

7. Applicant's arguments filed 7/22/04 have been fully considered but they are not persuasive.

Applicant argues that Kariya does not state the form in which the adhesive is applied, however Applicant's attention is brought to Column 4, lines 24-26, which states that the resin adhesive layer is laid down in a semi-cured state. One skilled in the art would have readily appreciated that use of the term "laid" indicates that the layer is semi-cured prior to laying it down and the semi-cure forms the resin into a sheet. Furthermore, Chung is optionally cited as evidence that it is conventional that semi-cured resin adhesive layers are sheets (Column 16, lines 10-19). It is noted that Chung is optionally cited in anticipation of Applicant arguing a semi-cured adhesive layer which is laid down is not a sheet.

It is noted that, Applicant's arguments with regards to the limitations of claim 3, 5, and 6 not being conventional is not found persuasive. As requested by Applicant, St. John is cited in combination with Kariya as evidence that it is conventional when forming composite circuit boards to plate via holes with copper and to partially cure conductive paste in the via holes prior to lamination.

It is also noted that Applicant did not traverse the limitations taken as conventional with respect to claims 7-9 and is considered to have acquiesced

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that the limitations are conventional. Any subsequent argument to the contrary will be considered untimely.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

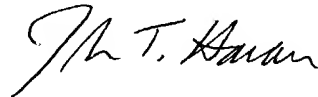
9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John T. Haran** whose telephone number is **(571) 272-1217**. The examiner can normally be reached on M-Th (8 - 5) and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Blaine Copenheaver can be reached on (571) 272-1156.

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The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



John T. Haran
Examiner
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